

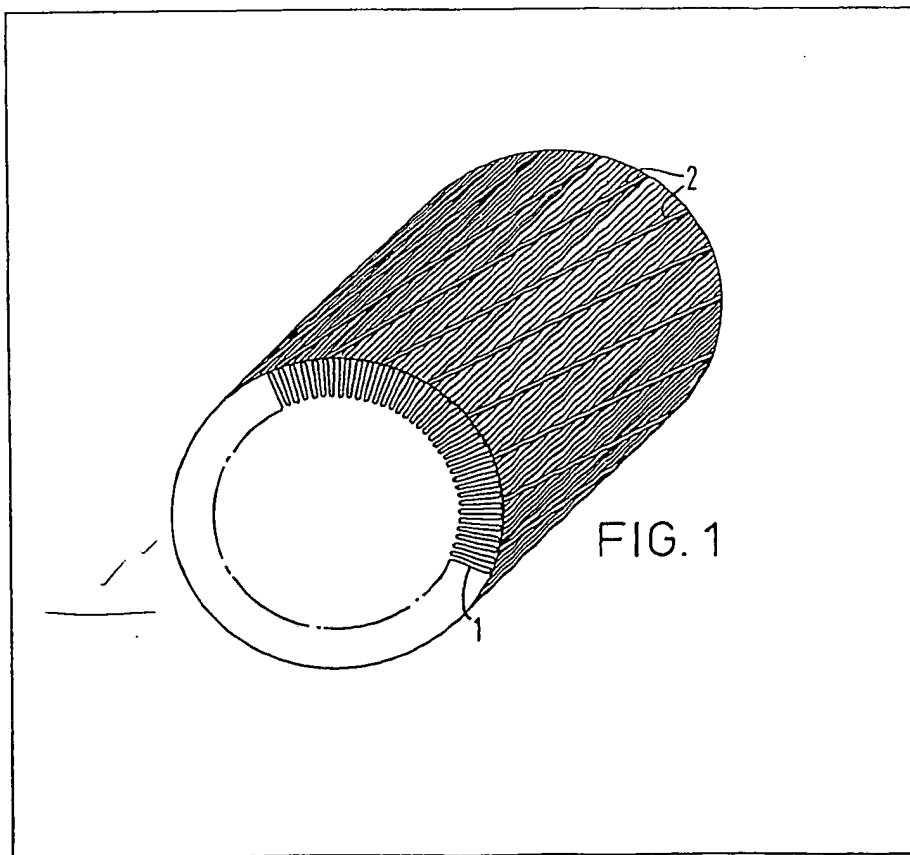
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- (71) Applicants
Compagnie des Produits
Industriels de L'Ouest,
B.P. 1226 - 44023 Nantes
Cedex,
France.
- (72) Inventor
Jean-Michel Sarrazin.
- (74) Agents
D. Young & Co.

(54) A filter element

(57) A filter element 1 such as for a motor vehicle air filter and in the form of an annular cylinder of pleated filter paper has a continuous line 2 of adhesive extending over the whole width of the strip of pleated paper, on the internal and/or external surface of the element, to form a support lattice which resists crushing stresses in normal use of the element. The adhesive is applied continuously from nozzles whilst the strip of pleated paper is flat prior to being cut and bent into the annular cylindrical configuration.



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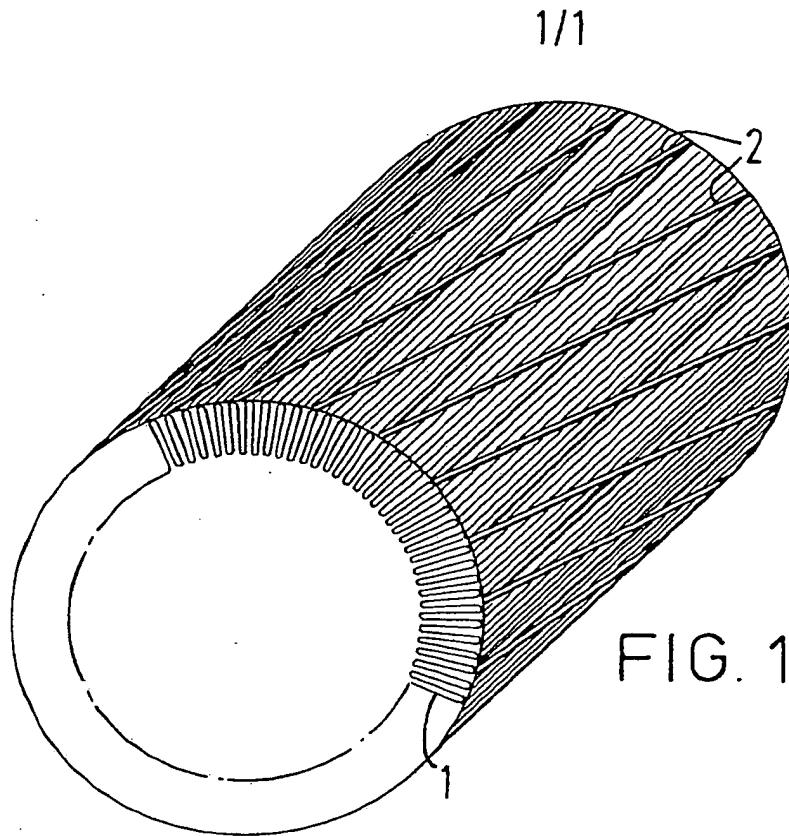


FIG. 2

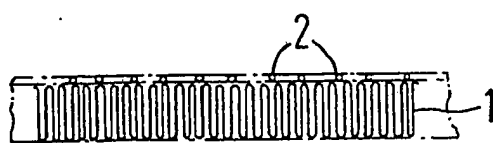
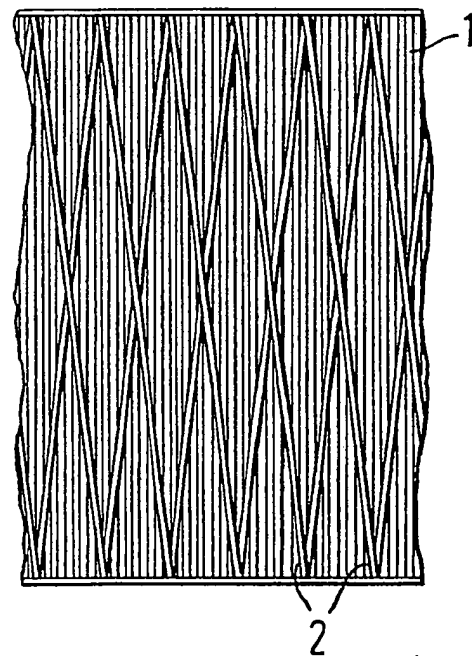


FIG. 3

SPECIFICATION

A filter element

5 This invention relates to a filter element suitable for use particularly, but not exclusively, in a motor vehicle for filtering, for example, air.

The problem encountered when fitting air filter elements is well known, that the elements, which
10 essentially comprise a folded sheet of filter material such as paper shaped as an annulus, have relatively little resistance to mechanical stresses.

To prevent it from being crushed, the filter structure is reinforced by providing it for example with
15 internal and/or external belts arranged parallel with the generatrices. These belts then take up the compressive forces and keep the initial spacing between the paper folds, thus ensuring good filtering action, despite the fact that the filter element is
20 gripped tightly in its seating.

However, this known arrangement is relatively expensive to produce, due to the presence of separate components and the resultant positioning operations. Furthermore, the reinforcing belts are
25 not directly joined to the filter paper so that compression of the paper may take place in use. This is detrimental to the consistently good performance of the element.

There is thus a need for a filter element which is
30 constructed so as to avoid the presence of complementary reinforcements added after manufacture and thus to minimise any decline in its operating capacity.

Accordingly the present invention provides a filter
35 element in the form of a pleated strip of paper at least one surface of which is provided with a continuous line of adhesive arranged over the whole width of the strip to form a lattice with mechanical properties which enable it to resist crushing stresses
40 to which the element is subjected in normal use.

For a better understanding of the present invention and to show how the same may be carried into effect, reference will now be made by way of example, to the accompanying drawings, in which :

45 *Figure 1* is a three quarter front perspective view of a filter element according to one embodiment of the invention,

Figure 2 is a view of part of the surface of the element of *Figure 1*, and

50 *Figure 3* is a sectional view taken in a plane perpendicular to the generatrices of *Figure 2*.

Referring now to the accompanying drawings, it will be seen that a filter element 1 according to the invention shown in *Figure 1*, has a conventional
55 basic structure and is made of a strip of filter paper folded into pleats and given a cylindrical annular shape. The absence of any added reinforcing belt is compensated for by the provision of a continuous line 2 of adhesive, such as "hot melt" adhesive, or
60 any synthetic adhesive material capable of adhering to the filter paper. This line 2 of adhesive extends across the whole width of the strip and forms a lattice which spreads over the whole external surface of the pleated paper strip of the element.

65 The filter element is made by continuously de-

positing adhesive material, preferably "hot melt" adhesive through continuously operating distributing nozzles located downstream of the outlet of a device for folding the strip of filter paper into pleats.

70 These nozzles cover the whole width of the flat strip of pleated paper in a reciprocating movement to deposit the lines of adhesive material forming the lattice 2.

The resultant lattice adheres perfectly to the paper
75 which supports it, and is deposited in "concealed time", that is to say, in time with the assembly line, during the operation of extracting the strip of paper from the folding device. Consequently this does not involve any extra time or handling, which would
80 increase the manufacturing price of the final product.

When the "hot melt" adhesive has cooled and solidified the pleated strip is then cut to the appropriate length and arranged in a closed annular shape to form the cylindrical element. The filter element thus
85 has a support lattice intimately joined to the paper. This gives it good resistance to crushing stresses in normal use and complete and constant maintenance of the spacing between the pleats, conditions which are necessary for satisfactory filtration.

90 It would, of course be within the scope of the invention for the lattice 2 to be not on the external surface of the filter element 1 but to be arranged on its internal surface, either exclusively or in combination with the external surface. A filter element
95 according to the invention is particularly suitable for use in a motor vehicle, such as for filtering air.

CLAIMS

100 1. A filter element in the form of a pleated strip of paper at least one surface of which is provided with a continuous line of adhesive arranged over the whole width of the strip to form a lattice with mechanical properties which enable it to resist crushing stresses
105 to which the element is subjected in normal use.

2. An element according to claim 1, wherein the pleated strip of paper is arranged in a cylindrical annular shape.

3. An element according to claim 1 or claim 2, wherein the adhesive is a "hot melt" adhesive.

110 4. An element according to any one of claims 1 to 3, wherein said at least one surface is the external surface of the element.

5. A filter element substantially as hereinbefore
115 described with reference to *Figures 1* to *3* of the accompanying drawing.

6. A method of making a filter element according to claim 1, including continuously depositing adhesive material in the form of a lattice, by means of
120 distributing nozzles located downstream of the outlet of a device for folding the strip of filter paper into pleats, the nozzles covering the whole width of the flat strip of pleated paper in a reciprocating movement, and then when the paper has cooled, cutting it to the appropriate length and arranging it in a closed annular shape to form the element.

7. A method of making a filter element according to claim 1, substantially as hereinbefore described with reference to *Figures 1* to *3* of the accompanying
130 drawing.